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10/539,773	12/29/2005	Stefan Helgee	038724.56337US	4951

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EXAMINER

KERNS, KEVIN P

ART UNIT	PAPER NUMBER
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1793

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/539,773	Applicant(s) HELGEE ET AL.	
	Examiner Kevin P. Kerns	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 February 2008 and 25 February 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-56 is/are pending in the application.
- 4a) Of the above claim(s) 49-56 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 47 is/are allowed.
- 6) ☒ Claim(s) 25-46 and 48 is/are rejected.
- 7) ☒ Claim(s) 25 and 47 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 July 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claims 25 and 47 are objected to because of the following informalities: in claims 25 and 47, 5th lines of both claims, insert "that" after "gas". In claims 25 and 47, 6th lines of both claims, insert "in" after "oxygen". Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 25, 27-29, 34, 36-44, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hundhausen (DE 36 00 813 A1 -- complete translation of the

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German document provided with the final rejection mailed August 7, 2007) in view of Gault (US 6,303,891).

Hundhausen discloses an arc welding process (including pulsed operation) for joining a ferritic, nodular, or ductile cast iron component (see claims 1 and 10; and last full paragraph on page 2 of translation) to a steel component under a protective gas mixture, in which the process includes providing a fusible (consumable steel wire) electrode and a protective gas mixture, with the protective gas mixture comprising argon, carbon dioxide, and oxygen; conducting arc welding (using pulsed or corona arc) of the two components to form a weld joint; and providing post-welding treatment via heating or annealing at optimum temperatures and times, as one of ordinary skill in the art would have recognized (abstract; and columns 1-3 of German text, which correspond to claims 1-12 and pages 2-4 of the translation). Although Hundhausen does not specifically disclose the ranges of percentages of the argon, carbon dioxide, and oxygen, in addition to the welding parameters set forth in a portion of the dependent claims, it would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980).

However, Gault discloses a universal shielding gas mixture for gas metal arc welding (GMAW) processes of ferrous metals (including, but not limited to, carbon steels and stainless steels – see abstract), in which the gas mixture includes about 95%

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argon, 3% carbon dioxide, and 2% oxygen, and with the arc welding process further including providing a wire having a diameter of 0.045" (about 1.14 mm), providing an arc voltage of 18-40 V and current of 130-300 A, and providing a sufficient wire feed rate, as one of ordinary skill in the art would have recognized and optimized, such that the shielding gas mixture and welding parameters used for welding of ferrous metals, including (but not limited to) carbon steels and stainless steels are advantageous for providing optimum welding conditions that will not alter the carbon content of the weld metal chemistry (abstract; column 1, lines 7-12; column 4, lines 28-67; column 5, lines 1-35 and 44-67; column 6, lines 1-67; column 7, lines 1-19; and Figure 1).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the arc welding process (including pulsed operation) for joining a ductile cast iron component to a steel component under a protective gas mixture, as disclosed by Hundhausen, by using the universal shielding gas mixture and optimized welding parameters for welding ferrous metals, including (but not limited to) carbon steels and stainless steels, as taught by Gault, in order to provide optimum welding conditions that will not alter the carbon content of the weld metal chemistry (Gault; column 4, lines 28-64; column 5, lines 8-12, 26-28, and 64-67; and column 6, lines 1-4).

5. Claims 26 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hundhausen (DE 36 00 813 A1) in view of Gault (US 6,303,891), as applied to claim 25 above, and further in view of Takano et al. (US 5,124,527).

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Hundhausen (in view of Gault) disclose and/or suggest the features of claim 25.

Neither Hundhausen nor Gault discloses the use of two welding wires to produce a weld joint having two layers.

However, Takano et al. disclose an arc-welding method and apparatus, in which the method includes providing two welding wires (1,2,) adjacent each other in a welding zone to produce a weld joint under a gas shield, such that the two welding wires are arranged to produce two layers and are advantageous for producing a high quality weld at rapid welding rates (abstract; column 1, lines 5-11; column 3, line 4 through column 5, line 63; column 6, line 39 through column 9, line 41; and Figures 1, 5, and 7).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the arc welding process (including pulsed operation) for joining a ductile cast iron component to a steel component under a protective gas mixture, as disclosed by Hundhausen, by using the universal shielding gas mixture and optimized welding parameters for welding ferrous metals, including (but not limited to) carbon steels and stainless steels, as taught by Gault, in order to provide optimum welding conditions that will not alter the carbon content of the weld metal chemistry, and by further using two welding wires to produce a weld joint having two layers, as disclosed by Takano et al., in order to produce a high quality weld at rapid welding rates (Takano et al.; abstract; column 3, lines 7-10 and 22-68; and column 4, lines 1-8).

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6. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hundhausen (DE 36 00 813 A1) in view of Gault (US 6,303,891), as applied to claim 25 above, and further in view of Fawer (US 5,558,791).

Hundhausen (in view of Gault) disclose and/or suggest the features of claim 25. Neither Hundhausen nor Gault discloses the use of nitrogen monoxide within the argon-based gas mixture.

However, Fawer discloses an arc welding method that includes addition of nitrogen monoxide in argon or an argon/helium mixture, such that nitrogen monoxide is advantageous for obtaining a smooth welding bead top surface with a normal penetration profile and secure flank formation, thus achieving reliable root welding (abstract; column 1, lines 40-67; column 2, lines 1-16 and 33-50; and Figures 1-3).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the arc welding process (including pulsed operation) for joining a ductile cast iron component to a steel component under a protective gas mixture, as disclosed by Hundhausen, by using the universal shielding gas mixture and optimized welding parameters for welding ferrous metals, including (but not limited to) carbon steels and stainless steels, as taught by Gault, in order to provide optimum welding conditions that will not alter the carbon content of the weld metal chemistry, and by further using nitrogen monoxide, as disclosed by Fawer, in order to obtain a smooth welding bead top surface with a normal penetration profile and secure flank formation, thus achieving reliable root welding (Fawer; abstract; and column 2, lines 39-50).

7. Claims 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hundhausen (DE 36 00 813 A1) in view of Gault (US 6,303,891), as applied to claim 25 above, and further in view of Church (US 4,463,243).

Hundhausen (in view of Gault) disclose and/or suggest the features of claim 25. Neither Hundhausen nor Gault discloses the use of specific amounts of helium in the shielding gas mixture.

However, Church discloses a welding system and method for electric arc welding of steels, in which the arc welding method includes providing a mixture of argon, helium, carbon dioxide, and oxygen, such that the mixture includes 25-60% helium and is advantageous for increasing weld joint penetration and improving weld bead shape with improved weld stability (abstract; column 1, lines 9-38; column 2, lines 32-68; column 3, lines 1-10; column 4, lines 23-68; column 5, lines 1-20; column 8, lines 3-12; column 11, lines 30-40 and 62-68; column 8, lines 1-4; and Figures 1 and 4).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the arc welding process (including pulsed operation) for joining a ductile cast iron component to a steel component under a protective gas mixture, as disclosed by Hundhausen, by using the universal shielding gas mixture and optimized welding parameters for welding ferrous metals, including (but not limited to) carbon steels and stainless steels, as taught by Gault, in order to provide optimum welding conditions that will not alter the carbon content of the weld metal chemistry, and by further using 25-60% helium in the mixture, as disclosed by Church,

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in order to increase weld joint penetration and improving weld bead shape with improved weld stability (Church; column 2, lines 39-60; and column 4, lines 23-34).

8. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hundhausen (DE 36 00 813 A1) in view of Gault (US 6,303,891), as applied to claim 25 above, and further in view of De Vito et al. (US 4,645,903).

Hundhausen (in view of Gault) disclose and/or suggest the features of claim 25. Neither Hundhausen nor Gault discloses a free electrode length of at least 15 mm.

However, De Vito et al. disclose a gas metal arc welding process in the presence of a gas mixture of argon, oxygen, and carbon dioxide, in which the process includes providing an electrode extension (free electrode length) of between $\frac{3}{4}$ to $1\frac{1}{4}$ inches (19-32 mm), such that the free electrode length is advantageous for providing high deposition rates without arc rotation (abstract; column 1, lines 4-8; column 2, lines 5-68; column 3, lines 1-68; column 4, lines 1-52; and Figure 1).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the arc welding process (including pulsed operation) for joining a ductile cast iron component to a steel component under a protective gas mixture, as disclosed by Hundhausen, by using the universal shielding gas mixture and optimized welding parameters for welding ferrous metals, including (but not limited to) carbon steels and stainless steels, as taught by Gault, in order to provide optimum welding conditions that will not alter the carbon content of the weld metal chemistry, and by further using an electrode extension (free electrode length) of

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between $\frac{3}{4}$ to $1\frac{1}{4}$ inches (19-32 mm), as disclosed by De Vito et al., in order to provide high deposition rates without arc rotation (De Vito et al.; abstract; and column 2, lines 23-30).

9. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hundhausen (DE 36 00 813 A1) in view of Gault (US 6,303,891), as applied to claim 25 above, and further in view of Bishel (US 3,778,588).

Hundhausen (in view of Gault) disclose and/or suggest the features of claim 25. Neither Hundhausen nor Gault discloses preheating the ductile cast iron parts to specified temperatures before the arc welding step.

However, Bishel discloses a method of welding ductile cast iron parts, in which the method includes providing a step of preheating the ductile cast iron parts to about 250 degrees Celsius prior to arc welding, such that the preheating is advantageous for preventing the free graphite in the welding electrode from diluting the parent metal of the iron parts in carbon (abstract; column 1, lines 33-39; column 3, lines 27-40 and column 5, lines 36-40).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the arc welding process (including pulsed operation) for joining a ductile cast iron component to a steel component under a protective gas mixture, as disclosed by Hundhausen, by using the universal shielding gas mixture and optimized welding parameters for welding ferrous metals, including (but not limited to) carbon steels and stainless steels, as taught by Gault, in order to provide

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optimum welding conditions that will not alter the carbon content of the weld metal chemistry, and by further using a step of preheating the ductile cast iron parts to about 250 degrees Celsius prior to arc welding, as disclosed by Bishel, in order to prevent the free graphite in the welding electrode from diluting the parent metal of the iron parts in carbon (Bishel; abstract; and column 3, lines 27-40).

Allowable Subject Matter

10. Claim 47 is allowed. [Note: claim 47 includes new claim objections].

Response to Amendment

11. The declaration under 37 CFR 1.132 filed February 25, 2008 is insufficient to overcome the rejection of claims 25-46 and 48 based upon the 35 USC 103(a) rejections in the last Office action for the reasons set forth in the following sections.

Response to Arguments

12. The examiner acknowledges the applicants' after final amendment entered upon filing of the request for continued examination (RCE), and a preliminary amendment with a declaration filed after entry of the RCE, which were received by the USPTO on December 7, 2007; February 7, 2008; and February 25, 2008, respectively. Upon review, claims 25 and 47 include claim objections (see above section 1). Claim 47 is allowed since the applicants have written it in independent form (see above section 10). The applicants are reminded of the previous restriction requirement with non-elected

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claims 49-56 (treated as withdrawn without traverse) in section 1 of the Office Action mailed April 9, 2007. Claims 25-48 remain under consideration in the application.

13. Applicants' arguments filed February 25, 2008 have been fully considered but they are not persuasive.

With regard to the applicants' remarks/arguments on pages 8-14, as well as the applicants' declaration under 37 CFR 1.132, it is first noted that the 35 USC 103(a) rejections of above sections 4-9 have been revised (see newly underlined portions) to reflect the following: 1) further details of the complete translation of Hundhausen (DE 36 00 813 A1); 2) further disclosure set forth by Gault; and 3) obviousness of the optimization of ranges of percentages of the argon, carbon dioxide, and oxygen.

Although the applicants' remarks/arguments and declaration set forth the advantages of their invention, as well as difficulties encountered when welding ductile cast iron (as opposed to welding of common steels), the additional newly underlined features render independent claim 25 obvious under 35 USC 103(a). Hundhausen (see complete translation of German document and the newly underlined portions of above section 4) teaches welding of ductile cast iron to steel in a gas mixture of argon, carbon dioxide, and oxygen (which would have been obvious to optimize the ranges of gases in the mixture, as set forth in above section 4). Moreover, Gault teaches the claimed gas mixtures (at values that fall within claimed ranges) for welding of ferrous metals, including (but not limited to) carbon steels (of which ductility is a property) and stainless steels. The examiner notes that both references have common teachings of high iron

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and carbon content, as well as gas mixtures containing argon, carbon dioxide, and oxygen (with Gault specifying claimed ranges and motivation for using the “universal” gas mixture). In supporting their arguments in the declaration, the applicants continue to state that there is no motivation to combine the references. Upon further review of the teachings of Hundhausen and Gault, when taken with the obviousness of the optimization of ranges of components within the gas mixture of independent claim 25, the examiner respectfully disagrees with the applicants' suggestion that a *prima facie* case of obviousness has not been established. In response to applicants' argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the universal shielding gas mixture for welding ferrous metals, including (but not limited to) carbon steels and stainless steels, as taught by Gault, are advantageous for providing optimum welding conditions that will not alter the carbon content of the weld metal chemistry (Gault; column 4, lines 28-64; column 5, lines 8-12, 26-28, and 64-67; and column 6, lines 1-4).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kevin P. Kerns whose telephone number is (571)272-1178. The examiner can normally be reached on Monday-Friday from 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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May 20, 2008